TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System for Fan Coil and Zoning Equipment

Product Bulletin

Code No. LIT-12011593
Issued July 13, 2010
Supersedes May 17, 2010

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System provides wireless networked control of Heating, Ventilating, and Air Conditioning (HVAC) equipment on a Building Automation System (BAS) that enables remote monitoring and programming. This system integrates into a supervisory controller that uses BACnet® Internet Protocol (IP) or BACnet Master-Slave/ Token-Passing (MS/TP) communications.

The TEC20xx-4+PIR Series Wireless Thermostat Controllers have occupancy sensing capability built into the device. These devices provide energy savings in high-energy usage light commercial buildings such as schools and hotels. The devices maximize these energy savings by using additional setpoint strategies during occupied times. See the *Integrated PIR Sensor – TEC20x6H-4+PIR Series Thermostat Controllers* section for more information.

TEC20 Coordinators allow the supervisory controller to communicate with multiple TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers:

- **TEC2045-4 Wireless Thermostat Controllers** control two-pipe fan coils, cabinet unit heaters, or other equipment using a proportional 0 to 10 VDC control input and one-speed fan control.
- **TEC20x6(H)-4 and TEC20x6H-4+PIR Series Wireless Thermostat Controllers** control two- or four-pipe fan coils, cabinet unit heaters, or other equipment using on/off, floating, or proportional 0 to 10 VDC control input, three speeds of fan control, dehumidification capability, and occupancy sensing capability.

Figure 1: TEC Wireless Thermostat Controller and TEC20 Coordinator with Direct-Mount Antenna and Remote Mount Antenna

- **TEC20x7-4 Series Wireless Thermostat Controllers** control local hydronic reheat valves, pressure dependent Variable Air Volume (VAV) equipment with or without local reheat, or other zoning equipment using an on/off, floating, or proportional 0 to 10 VDC control input.

The wireless mesh network uses ZigBee™ technology to enable remote monitoring and programming and to enhance reliability by providing redundant transmission paths through other TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers, creating a resilient, self-healing mesh network.

Table 1: Features and Benefits (Part 1 of 2)

Features	Benefits
Wireless Communication	Allows BAS communications capability in applications where field bus wiring within the building is prohibitive.
Onboard Occupancy Sensor (Passive Infrared [PIR] Models)	Provides energy savings without additional installation time and cost.
Password Protection Option	Protects against unwanted thermostat controller tampering.
Integral Humidity Sensing Capability (Dehumidification Models)	Increases occupancy comfort by providing dehumidification.

Table 1: Features and Benefits (Part 2 of 2)

Features	Benefits
On/Off, Floating, or Proportional 0 to 10 VDC Control	Offers additional application flexibility by providing more advanced control signals.
Three Speeds of Fan Control (Model Dependent)	Provide easy **FAN** speed selection via the interface key, to meet the application requirements.
Single/Dual Setpoint Adjustment	Enables user setpoint options to accommodate application.
Integral Wireless Signal Strength Testing Built into Wireless Thermostat Controllers and Coordinators	Provides quick, easy, visual indication of the wireless RF signal strength between a sensor and associated receiver, helps locate optimum device positions during installation, and aids in troubleshooting your applications.
Backlit Liquid Crystal Display (LCD)	Offers real-time control status of the environment in easy-to-read, English text messages with constant backlight that brightens during user interaction.
Two Configurable Binary Inputs	Provide additional inputs for advanced functions such as remote night setback, service or filter alarms, motion detector, and window status.
Over 20 Configurable Parameters	Enable the TEC20xx-4 or TEC20xx-4+PIR Series Wireless Thermostat Controller to adapt to any application, allowing installer parameter access without opening the cover.
Optional Discharge Air Sensor	Monitors unit efficiency.

Applications

IMPORTANT: Use the TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat controller could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System.

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System is ideal for any location where it is cost-prohibitive, difficult, or aesthetically unappealing to hardwire between BACnet devices, including supervisory controllers (such as NCE25 or NAE35/45/55 engines) and thermostat controllers. Examples of these locations include the following:

- commercial structures with brick or solid concrete walls and/or ceilings that impede hard-wired TEC20xx-4 and TEC20xx-4+PIR Series Thermostat Controller applications
- office buildings, retail stores, and other commercial real estate where tenant turnover is frequent
- museums, historical buildings, atriums, and other sites where building aesthetics and historical preservation are important
- buildings with marble, granite, glass, mirrored, wood veneer, or other decorative surfaces that present challenges to hard-wired applications
- buildings with asbestos or other hazardous materials that must not be penetrated or disturbed
- buildings with occupants sensitive to disruptions to business

Locations or applications that prohibit cellular telephones or Wireless Fidelity (WiFi) systems are unsuitable for the TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System:

- operating rooms or radiation therapy rooms
- validated environments
- UL864 applications

Wireless Communication

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System uses Direct Sequence Spread Spectrum (DSSS) Radio Frequency (RF) technology and operate on the 2.4 GHz Industrial, Scientific, and Medical (ISM) band. The system meets the Institute of Electrical and Electronic Engineers (IEEE) 802.15.4 standard for low power, low duty-cycle RF transmitting systems and are compatible with wireless mesh networks compliant with the ZigBee standard. The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System uses a transmission power of 10 dBm.

For more information on wireless communication in the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controller System, refer to the *TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011596)*.

Wireless Signal Transmission Range

Line-of-sight transmission ranges between a TEC20 Coordinator and a TEC20xx-4 or TEC20xx-4+PIR Wireless Thermostat Controller (or between TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers) can be less than the recommended distances shown in Table 2. The effective transmission range for indoor applications varies because of RF signal absorption and reflection due to metal obstructions, walls (or floors), and furniture found in typical building interiors.

Table 2: Recommended Transmission Ranges

Type	Distance
Through Walls	10 m (30 ft)
Open Space	30 m (100 ft)

For detailed information on locating devices for optimum signal strength, refer to the *Wireless Metasys System Location Guide (LIT-12011294),* which is available on the Johnson Controls® Portal intranet site.

Wireless RF Interference and Security

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System is designed to virtually eliminate RF interference with other wireless applications. In most commercial environments, the TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System does not encounter or generate RF interference, even in environments with cell phones and competing WiFi applications. Wireless RF transmissions using ZigBee technology use different modulation schemes than WiFi applications and use frequencies between popular WiFi bands, enabling these networks to exist in the same areas.

While using industry-standard frequencies, the TEC Series Wireless Thermostat Controller System uses a proprietary protocol that secures the RF data transmissions and inhibits the deciphering of any intercepted RF data.

For more information on RF interference and wireless security, refer to the following documents:

- *TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011596)*
- *Wireless Metasys System Location Guide (LIT-12011294),* which is available on the Johnson Controls Portal intranet site.

System Overview

A TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System consists of:

- a supervisory controller
- at least one TEC20 Coordinator and 15 VDC power supply (available separately)
- multiple TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers

A TEC20 Coordinator enables the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers to communicate with the supervisory controller, which schedules occupancy, collects trend data, overrides points, and monitors alarms. The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System confirms and synchronizes data transmissions between the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers and TEC20 Coordinators.

Figure 2 illustrates a simple TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System using BACnet MS/TP or BACnet IP communication protocol.

For information on commissioning and configuring a TEC Series Wireless Thermostat Controller System for operation, refer to the *TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011596).*

Component Quantities

A TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System can support up to:

- 100 TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers per MS/TP trunk on the supervisory controller
- 254 TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers integrated through BACnet IP on a supervisory controller
- 30 TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers per TEC20 Coordinator

Each increment of 30 TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers requires one additional TEC20 Coordinator. See Table 3 for component quantities.

Table 3: TEC20xx-4 and TEC20xx-4+PIR Wireless System Component Quantities

Number of TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers	TEC20 Coordinators Required
1-30	1
31-60	2
61-90	3
91-100	4

TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers can be added as repeaters, as required, to extend range and provide redundant pathways. TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers serving only as repeaters do not count towards the totals shown in Table 3; however, indiscriminate use of TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers as repeaters can lead to reduced performance.

BACnet MS/TP Limitations

TEC20 Coordinators each count as a single device in the BACnet MS/TP trunk limitations. TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers do not count toward device limitations; however, they do count towards number of points limitations on a supervisory controller.

BACnet IP Limitations

Parameters on TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers that are integrated into the supervisory controller as points count towards limitations of number of points per supervisory controller.

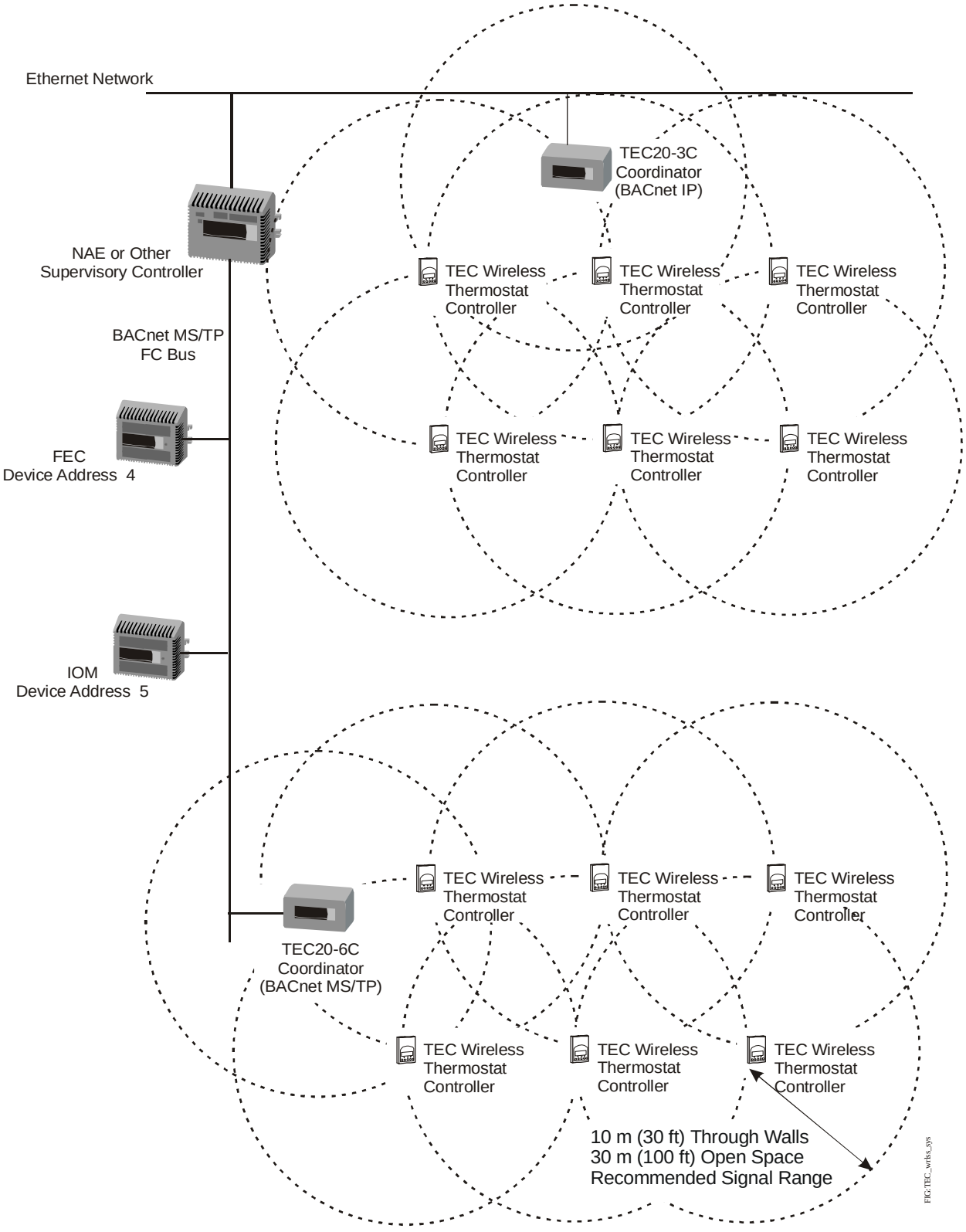

Figure 2: TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System

Component Descriptions

Supervisory Controllers

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System uses Web-enabled, Ethernet-based, supervisory controllers that connect BAS networks to Internet Protocol (IP) networks and the Web. These supervisory controllers provide scheduling, alarm and event management, trending, energy management, data exchange, dial-out capability, and password protection. With a computer running Microsoft® Internet Explorer® Web browser version 6.0 (or later), you can browse to a configured supervisory controller, and monitor and control BAS field devices in the User Interface (UI).

Refer to the *TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011596)* for information on configuring a TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controller System.

TEC20 Coordinators

A TEC20 Coordinator provides a wireless interface between a supervisory controller and the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers, allowing the exchange BACnet IP (TEC20-3C) or BACnet MS/TP (TEC20-6C) messages.

The TEC20 Coordinator initiates the formation of the wireless mesh network – one is required per wireless mesh network. Each TEC20 Coordinator and the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers assigned to it share a Personal Area Network Identification (PAN ID).

A TEC20 Coordinator requires a 15 VDC power source (available separately). The TEC20-8X-1 120 VAC power cord or NPB-PWR 24 VAC/DC DIN rail mount power modules supply sufficient power to the TEC20 Coordinator (Figure 4). An optional remote-mount antenna and cable is available to allow transmission when the TEC20 Coordinator is mounted inside a metal panel.

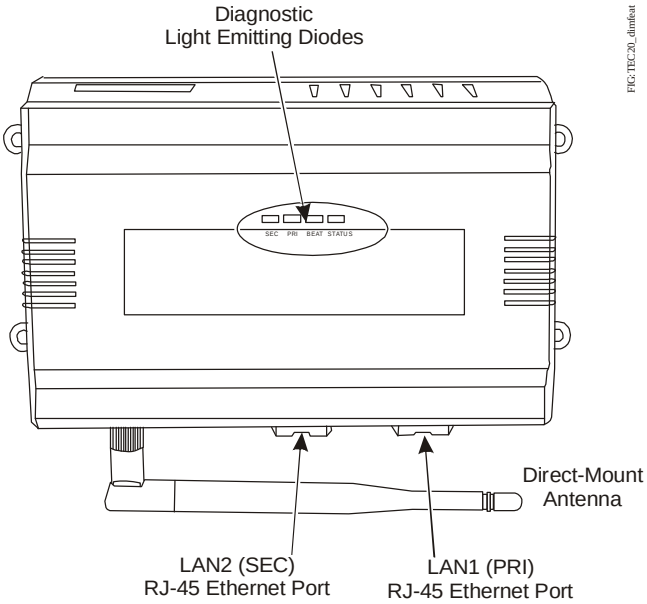

Figure 3: TEC20 Coordinator Physical Features

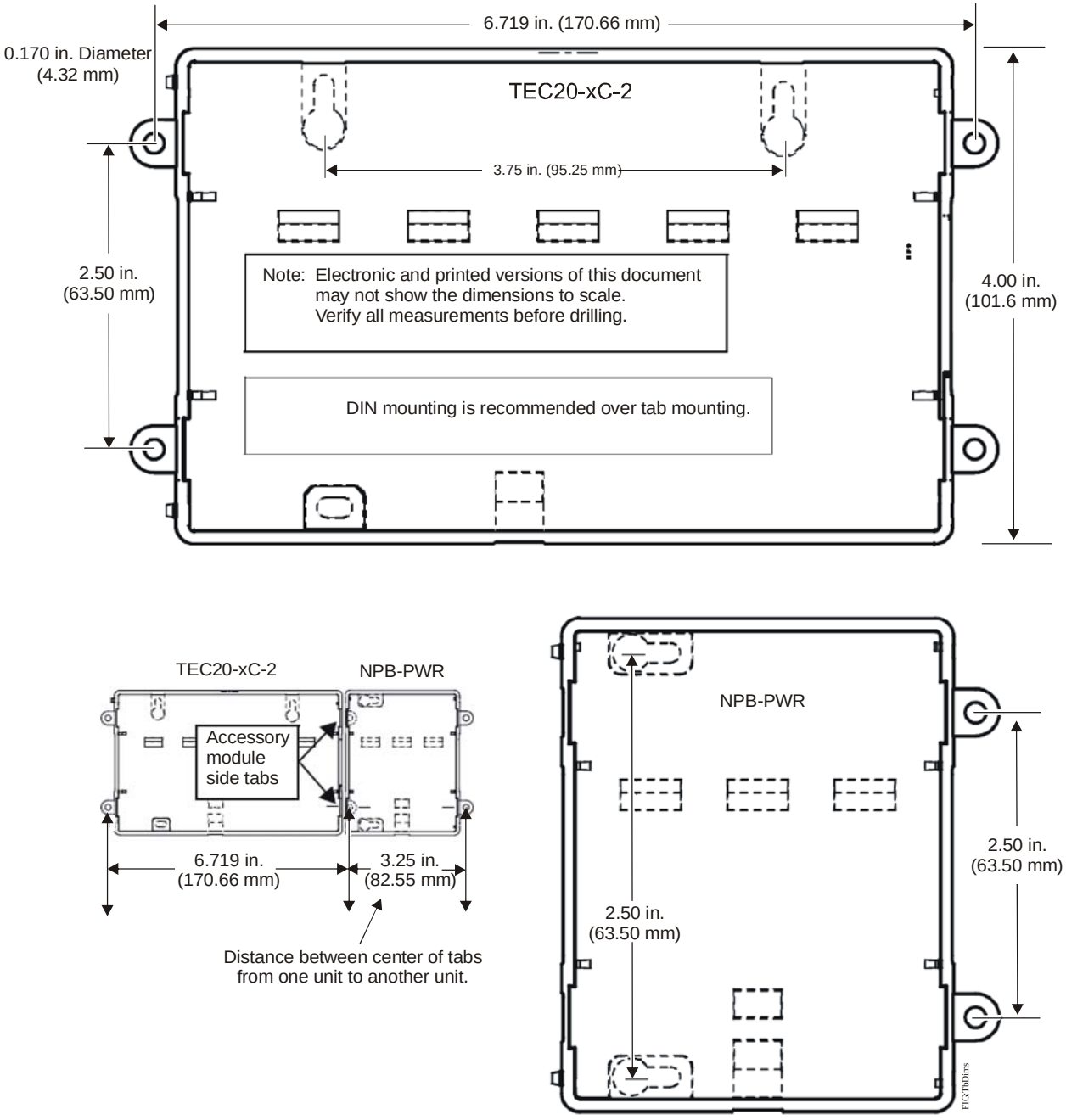

Figure 4: TEC20 Coordinator and NPB-PWR Module Dimensions, in. (mm)

TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers

Depending on the model, the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers can communicate sensed temperature, setpoint temperature, and other data with an associated supervisory controller. Using this information, the TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers control a variety of fan coil and zoning equipment. See *Applications* for more information.The TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers are designed for indoor, intra-building applications only.

The TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers can also serve as repeaters to extend the range of the BACnet data communications within the wireless mesh network.

See Figure 5 for dimensions and Figure 6 for the thermostat controller cover view.

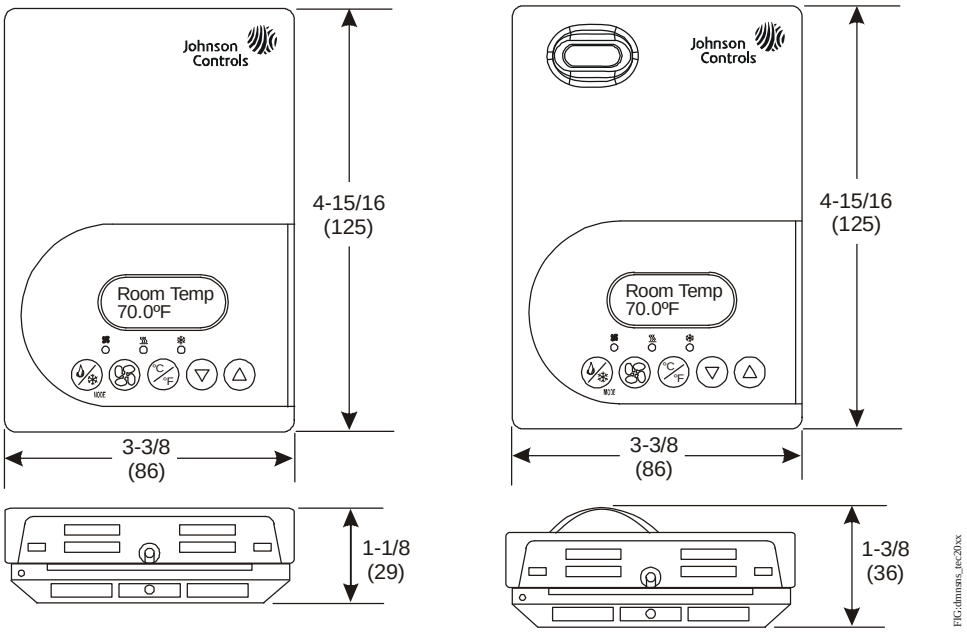

Figure 5: TEC20xx-4 and TEC20xx-4+PIR Series Thermostat Controllers Dimensions, in. (mm)

See the following list and Table 4 for features common to TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers for fan coil and zoning equipment:

- **Adjustable Heating/Cooling Deadband**
  Adjusts the minimum heating/cooling deadband from 2.0F°/1.0C° to 5.0F°/2.5C°.
- **Adjustable Time Delay for Activating Unoccupied Setpoints**
  Allows the user to adjust time delay before unoccupied setpoints are enabled to maintain comfort temperatures while conserving energy.
- **Occupancy Sensing in Conjunction with Door Switch Toggle**
  Adds more efficiency by associating the door switch into the sequence of operation.
- **Remote Indoor Sensing**
  Accommodates remote indoor sensors. Up to three indoor sensors can be averaged.
- **Five Easy-to-Use Interface Keys**
  Allow for easy commissioning of the thermostat controller, and eliminate the need for DIP switches.
- **Six Levels of Keypad Lockout**
  Provide six levels of keypad lockout that can be set up through the Installer Configuration Menu.
- **Accessible Configuration Parameters**
  Allow local access to all configurable parameters while limiting unwanted parameter tampering once the thermostat controller is set up.

- **Three Light-Emitting Diodes (LEDs)**
  Provide fan, heating, and cooling status at a glance.
- **Adjustable Temporary Occupancy Time**
  Adjusts the temporary occupancy time from 0 to 24 hours.
- **Auxiliary Contact**
  Provides 24 VAC control for reheat, lighting, and other auxiliary functions.
- **Adjustable Heating/Cooling Cycles per Hour (On/Off Control)**
  Configurable for the maximum number of heating and cooling cycles (3 to 8 cycles maximum) in a 1-hour period, balancing temperature control and equipment cycling.
- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EEPROM)**
  Prevents loss of adjusted parameters during a power failure.
- **Remote Access**
  Allows the user to read/write and access the parameters of the thermostat controller via a supervisory controller.

Table 4: TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers Comparison

Feature	TEC2045-4 Model	TEC20x6(H)-4 and TEC20x6H-4 Series	TEC20x7-4 Series
Interface Keys	5	5	3
Levels of Keypad Lockout	6	6	4
Temporary Occupancy Time	0 to 24 hours	0 to 24 hours	0 to 24 hours
Remote Sensing with Sensor Averaging	No	Up to 3 indoor sensors	Up to 3 indoor sensors
Heating/Cooling Cycles per Hour	No	3 to 8 heating or cooling cycles maximum per hour	3 to 8 heating or cooling cycles maximum per hour
Number of LEDs	3	3	2
Status Indication	fan, heating, cooling	fan, heating, cooling	heating, cooling
Single/Dual Setpoint Adjustment	yes	yes	no

Thermostat Controller User Interface Keys

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers user interface consists of five keys on the front cover (Figure 6). The function of each key is as follows:

- **MODE** key toggles among the system modes available, as defined by selecting the appropriate operation sequence in the Installer Configuration Menu (Off, Heat, Cool, Auto).
- **FAN** key toggles among the fan modes available, as defined by selecting the appropriate fan menu options defined in the Installer Configuration Menu (Low, Med, High, Auto).
- **OVERRIDE** key (commercial models) overrides the unoccupied mode to occupied at the local user interface for the specified TOccTime. (TOccTime is defined by selecting the appropriate time period in the Installer Configuration Menu.) If one of the binary inputs is configured to operate as a remote override contact, this **OVERRIDE** function is disabled. The **OVERRIDE** key also allows access to the Installer Configuration Menu. (See the *Installer Configuration Menu* section.)
- **°C/°F** key (hospitality models) changes the temperature scale to either Celsius or Fahrenheit and allows access to the Installer Configuration Menu. (See the *Installer Configuration Menu* section.)
- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

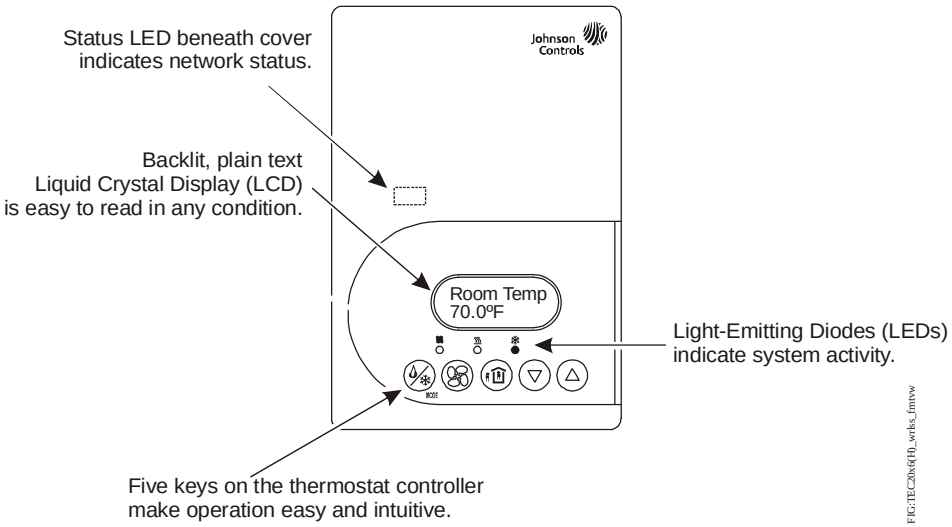

Figure 6: Front Cover of Thermostat Controller, TEC20x6(H)-4 Model Shown

Note: For hospitality models, binary inputs can override from the unoccupied mode to occupied mode.

Table 5: User Interface Keys

Keys	TEC2045-4 Model	TEC20x6(H)-4, TEC20x6H-4 +PIR Series	TEC20x7-4 Series
Mode	Yes	Yes	No
Fan	Yes	Yes	No
Override	Yes	Yes[1] and No[2]	Yes
Up/ Down	Yes	Yes	Yes
C/F	No	No[1] and Yes[2]	No

1. Commercial (TEC20x6-4) models.
2. Hospitality (TEC20x6H-4 and TEC20x6H-4+PIR) models.

LEDs

Three LEDs are included to indicate the fan status, call for heat, or call for cooling:

- The fan LED is on when the fan is on.
- The heat LED is on when heating is on.
- The cool LED is on when cooling is on.

Table 6: LED Status Indicators (Part 1 of 2)

LED	TEC2045-4 Model	TEC20x6(H)-4, TEC20x6H-4 +PIR Series	TEC20x7-4 Series
FAN	Yes	Yes	No
HEAT	Yes	Yes	Yes

Table 6: LED Status Indicators (Part 2 of 2)

LED	TEC2045-4 Model	TEC20x6(H)-4, TEC20x6H-4 +PIR Series	TEC20x7-4 Series
COOL	Yes	Yes	Yes

Backlit LCD

The TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers include a 2-line, 8-character backlit display. Low-level backlighting is present during normal operation, and it brightens when any user interface key is pressed. The backlight returns to low level when the device is left unattended for 45 seconds.

Integrated PIR Sensor – TEC20x6H-4+PIR Series Thermostat Controllers

The integrated PIR sensor allows for automatic switching between fully adjustable Occupied and Stand-By temperature setpoints without user interaction. This feature generates incremental energy savings during scheduled occupied periods while the space is unoccupied.

Status Display Menu

The Status Display Menu is displayed during normal thermostat controller operation. This menu continuously scrolls through the following parameters:

- Room Temperature (All Models) and Humidity (TEC2036 and TEC2056 Models)
- System Mode

- Occupancy Status (Occupied/Stand-By/Unoccupied/Override)
- Applicable Alarms (The backlight lights up as an alarm condition is displayed.)

Note: An option is available within the Installer Configuration Menu to lock out the scrolling display and show only the **Room Temperature** parameter.

For more information on what parameters are available on specific models, see Table 8.

Installer Configuration Menu

The Installer Configuration Menu allows the installer to set up the TEC Wireless Thermostat Controller for an application-specific operation. To access the menu, press and hold the center key (TEC2045-4 Model, TEC20x6[H]-4 Series, and TEC20x6[H]-4+PIR Series) or **OVERRIDE** key (TEC20x7-4 Series) for approximately 8 seconds.

Press the same key to cycle through the Installer Configuration Menu parameters. See Table 8.

Table 7: Status Display Menu Parameters

Status Item	TEC2045-4 Model	TEC20x6(H)-4 and TEC20x6H-4+PIR Series	TEC20x7-4 Series
Room Temperature	Yes	Yes	Yes
Humidity	No	Yes[1]	No
System Mode	Yes	Yes	Yes
Occupancy Status	Yes	Yes	Yes
Applicable Alarms	Yes	Yes	Yes

1. TEC2036-4, TEC2036H-4, TEC2036H-4+PIR, TEC2056-4, TEC2056H-4, TEC2056H-4+PIR Models only.

Table 8: Installer Configuration Menu Parameters (Part 1 of 2)

Installer Configuration Menu Parameters	TEC2045-4 Model	TEC20x6(H)-4 and TEC20x6H-4+PIR Series	TEC20x7-4 Series
Password Protection	Yes	Yes	Yes
Communication Address	Yes	Yes	Yes
PAN ID	Yes	Yes	Yes
Channel	Yes	Yes	Yes
GET FROM	Future Functionality - Not Available at This Release		
BI1 and BI2 Input Configuration	Yes	Yes	Yes
UI3 Input Configuration to Locally Monitor Supply Air Temperature or Hot/Cold Water Changeover Switching	Yes	Yes	Yes
Menu Scroll	Yes	Yes	Yes
Auto Mode	Yes	Yes	No
°F and °C Temperature Scales	Yes	Yes	Yes
% RH Display	No	Yes[1]	No
Keypad Lockout Levels	Yes	Yes	Yes
Pipe No.	No	Yes	No
Output Configuration	No	No	Yes
Control Type	No	Yes[2]	Yes[3]
Sequence of Operation	Yes	Yes	Yes
Fan Menu	No	Yes	No
Dehumidification Network Lockout	No	Yes[1]	No
Dehumidification Setpoint	No	Yes[1]	No

Table 8: Installer Configuration Menu Parameters (Part 2 of 2)

Installer Configuration Menu Parameters	TEC2045-4 Model	TEC20x6(H)-4 and TEC20x6H-4+PIR Series	TEC20x7-4 Series
Dehumidification Hysteresis (Deadband)	No	Yes[1]	No
Maximum Dehumidification Cooling Output	No	Yes[1]	No
Stand-By Timer Value	Yes	Yes	Yes
Unoccupied Timer Value	Yes	Yes	Yes
Stand-By Heating Setpoint/Stand-By Cooling Setpoint	Yes	Yes	Yes
Unoccupied Heating Setpoint/Unoccupied Cooling Setpoint	Yes	Yes	Yes
Maximum Heating Setpoint/Minimum Cooling Setpoint	Yes	Yes	Yes
Proportional Band Adjustment	Yes	Yes	Yes
Setpoint Type	Yes	Yes	Yes
Single/Dual Setpoint Adjustment	Yes	Yes	No
Temporary Occupancy Time	Yes	Yes	Yes
Heating/Cooling Deadband	Yes	Yes	Yes
Room Air Temperature Calibration	Yes	Yes	Yes
Room Humidity Calibration	No	Yes[1]	No
Auxiliary Configuration	Yes	Yes	Yes
Auto Fan Mode	No	Yes	No
Floating Time (Floating Models)	No	Yes[2]	Yes[3]
Direct/Reverse Acting	Yes	Yes[4]	Yes[5]
Cycles per Hour (On/Off Models)	No	Yes[2, 6]	Yes[3]
Reheat Time	Yes	Yes	Yes
Display UI3 Value	Yes	Yes	Yes

1. TEC2036-4, TEC2036H-4, TEC2036H-4+PIR, TEC2056-4, TEC2056H-4, and TEC2056H-4+PIR models only.
2. TEC2026-4, TEC2026H-4, TEC2026H-4+PIR, TEC2036-4, TEC2036H-4, and TEC2036H-4+PIR models only.
3. TEC2027-4 model only.
4. TEC2045-4, TEC2046-4, TEC2046H-4, TEC2046H-4+PIR, TEC2056-4, TEC2056H-4, and TEC2056H-4+PIR models only.
5. TEC2047-4 model only.
6. TEC2016-4, TEC2016H-4, and TEC2016H-4+PIR models only.

Ordering Information

Table 9 lists ordering codes for the TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers; Table 10 lists ordering codes for the TEC20 Coordinator; and Table 11 lists ordering codes for TEC20xx-4 and TEC20xx-4+PIR Series Wireless Thermostat Controllers accessories.

Repair Information

If a TEC20xx-4 or TEC20xx-4+PIR Series Wireless Thermostat Controller System fails to operate within its specifications, replace the unit. For a replacement, contact the nearest Johnson Controls representative.

Table 9: TEC20xx-4 and TEC20xx-4+PIR Thermostat Controller Models

Code Number	Control Outputs	Speeds of Fan Control	Dehumidification Capability	Market	Application Category
TEC2016-4	Two On/Off	3	No	Commercial	1
TEC2016H-4	Two On/Off	3	No	Hospitality	1
TEC2016H-4+PIR[1]	Two On/Off	3	No	Hospitality	1
TEC2026-4	Two On/Off or Floating	3	No	Commercial	1
TEC2026H-4	Two On/Off or Floating	3	No	Hospitality	1
TEC2026H-4+PIR[1]	Two On/Off or Floating	3	No	Hospitality	1
TEC2027-4	Two On/Off or Floating	0	No	Commercial	2
TEC2036-4	Two On/Off or Floating	3	Yes	Commercial	1
TEC2036H-4	Two On/Off or Floating	3	Yes	Hospitality	1
TEC2036H-4+PIR[1]	Two On/Off or Floating	3	Yes	Hospitality	1
TEC2045-4	One Proportional 0 to 10 VDC	1	No	Commercial	3
TEC2046-4	Two Proportional 0 to 10 VDC	3	No	Commercial	1
TEC2046H-4	Two Proportional 0 to 10 VDC	3	No	Hospitality	1
TEC2046H-4+PIR[1]	Two Proportional 0 to 10 VDC	3	No	Hospitality	1
TEC2047-4	Two Proportional 0 to 10 VDC	0	No	Commercial	2
TEC2056-4	Two Proportional 0 to 10 VDC	3	Yes	Commercial	1
TEC2056H-4	Two Proportional 0 to 10 VDC	3	Yes	Hospitality	1
TEC2056H-4+PIR[1]	Two Proportional 0 to 10 VDC	3	Yes	Hospitality	1

Application Categories

1. Two- or four-pipe fan coils, cabinet unit heaters, or other equipment using on/off, floating, or proportional 0 to 10 VDC control input, and three speeds of fan control.

2. Local hydronic reheat valves, pressure dependent Variable Air Volume (VAV) equipment with or without local reheat, or other zoning equipment using an on/off, floating, or proportional 0 to 10 VDC control input.

3. Two-pipe fan coils, cabinet unit heaters, or other equipment using a proportional 0 to 10 VDC control input and one-speed fan control.

1. Includes onboard occupancy sensor.

Table 10: TEC20 Coordinator Ordering Information

Code Number	Description
TEC20-3C-2	BACnet IP Wireless Coordinator; Requires 15 VDC Power Supply
TEC20-6C-2	BACnet MS/TP Wireless Coordinator; Requires 15 VDC Power Supply

Table 11: TEC Wireless Accessories (Order Separately) (Part 1 of 2)

Code Number	Description
SEN-600-1	Remote Indoor Air Temperature Sensor
SEN-600-4	Remote Indoor Air Temperature Sensor with Occupancy Override and LED
TE-636S-1	Strap-Mount Temperature Sensor
TE-6361M-1[1]	Duct Mount Air Temperature Sensor
TEC20-A-1	Replacement antenna for TEC20 Coordinator
TEC20-RA-1	Remote antenna for TEC20 Coordinator when it is installed inside a metal cabinet or when remote antenna mounting is required by physical installation

Table 11: TEC Wireless Accessories (Order Separately) (Part 2 of 2)

Code Number	Description
NPB-PWR[2]	DIN Rail Mount 24 VAC/DC Power Module for TEC20 Coordinator
TEC20-8X-1	120 VAC to 15 VDC Power Supply for TEC20 Coordinator
TEC20-9B-1	Replacement Battery Pack for TEC20 Coordinator
TEC-6-PIR[3]	Commercial Fan Coil Cover with Occupancy Sensor
TEC-6H-PIR[4]	Hospitality Fan Coil Controller Cover with Occupancy Sensor
TEC-7-PIR[5]	Zone Controller Cover with Occupancy Sensor

1. Additional TE-636xx-x Series 10k ohm Johnson Controls Type II Thermistor Sensors are available; refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for more details.
2. DIN Rail: Type NS35/7.5 (35 x 7.5 mm) and DIN rail end clips. Length of DIN rail depends on the number of DIN rail mounted options.
3. The TEC-6-PIR Accessory Cover can be used to replace the existing cover on a non-PIR TEC20x6-4 Series Wireless Thermostat Controller to provide occupancy sensing capability.
4. The TEC-6H-PIR Accessory Cover can be used to replace the existing cover on a non-PIR TEC20x6H-4 Series Wireless Thermostat Controller to provide occupancy sensing capability.
5. The TEC-7-PIR Accessory Cover can be used to replace the existing cover on a non-PIR TEC20x7-4 Series Wireless Thermostat Controller to provide occupancy sensing capability.

Technical Specifications

TEC20 Wireless Coordinator (Part 1 of 2)

Product Code Numbers	**TEC20-3C-2:** BACnet IP version **TEC20-6C-2:** BACnet MS/TP version
Power Requirements	15 VDC, 6 W maximum
Platform	IBM® PowerPC 405EP 250 MHz Processor 64 MB SDRAM and 64 MB Serial Flash Battery Backup - shutdown begins within 10 seconds Real-time clock - 3 month backup maximum with battery
Operating System	Niagra^{AX}
Communications	**Ethernet:** Two 10/100 Mbps Ports (RJ-45 Connection) **RS-232:** 9-Pin D-Shell Connection **RS-485:** 3-Pin Non-Isolated Port
Transmission Range	**Through Walls:** 10 m (30 ft) **Line-of-Sight (Open Space):** 30 m (100 ft)
RF Band	Direct-Sequence Spread-Spectrum Transmission; 2.4 Ghz unlicensed band
Transmission Power	10 mW Maximum
Wire Size	18 AWG Maximum, 22 AWG Recommended
Ambient Conditions	**Operating:** 0 to 50°C (32 to 122°F); 95% RH Maximum, Noncondensing
	Storage: -20 to 60°C (-4 to 140°F); 95% RH Maximum, Noncondensing
Compliance	**United States:** UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment FCC Compliant to CFR 47, Part 15, Subpart B and Part 15 Class A (Other compliance information pending) **Canada:** C-UL Listed, File E207782, CCN XAPX7, Under CAN/ CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment, and C22.2 No. 205-M1983 Signal Equipment Industry Canada, ICES-003 (Other compliance information pending)

TEC20 Wireless Coordinator (Part 2 of 2)

Dimensions (H x W x D)	122.4 x 160.4 x 61.9 mm (4.820 x 6.313 x 2.438 in.)
Shipping Weight	0.499 kg (1.1 lb)

TEC20xx-4 and TEC20xx-4+PIR Wireless Thermostat Controllers for Fan Coil and Zoning Equipment Control

Power Requirements	19 to 30 VAC, 50/60 Hz, 2 VA (Terminals 4 and 5) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Analog Output Rating	**Proportional Control (TEC204x-4 and TEC205x-4) Models** 0 to 10 VDC into 2k ohm Resistance (Minimum)
Fan Relay Output Rating	**TEC2045-4, TEC20x6(H)-4, TEC20x6H-4+PIR Models:** 19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush
Relay/Triac Contact Rating	**On/Off and Floating Control (TEC201x[H]-4, TEC201xH-4+PIR, TEC202x[H]-4, TEC202xH-4+PIR, TEC203x[H]-4, TEC203xH-4+PIR Models):** 19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
Auxiliary Output Rating	**Triac Output:** 19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush
Binary Inputs	Voltage-Free Contacts across Terminal Scom to Terminals BI1, BI2, or UI3
Transmission Range	**Through Walls:** 10 m (30 ft) **Line-of-Sight (Open Space):** 30 m (100 ft)
RF Band	Direct-Sequence Spread-Spectrum Transmission; 2.4Ghz unlicensed band
Transmission Power	10 mW Maximum
Wire Size	18 AWG Maximum, 22 AWG Recommended
Temperature Sensor Type	Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor
Resolution	±0.1C°/±0.2F°
Accuracy	**Temperature:** ±0.5C°/±0.9F° at 21.0°C/70.0°F Typical Calibrated
	Humidity (TEC2036[H]-2 or TEC2056[H]-2Models): ±5% RH from 20 to 80% RH at 10 to 32°C (50 to 90°F)
Temperature Range	**Backlit Display:** -40.0°C/-40.0°F to 50.0°C/122.0°F **Heating Control:** 40.0°F/4.5°C to 32.0°C/ 90.0°F in 0.5° Increments **Cooling Control:** 54.0°F/12.0°C to 38.0°C/100.0°F in 0.5° Increments
Minimum Deadband	1C°/2F° between Heating and Cooling
Ambient Conditions	**Operating:** 0 to 50°C (32 to 122°F); 95% RH Maximum, Noncondensing **Storage:** -30 to 50°C (-22 to 122°F); 95% RH Maximum, Noncondensing
Compliance (Pending)	**United States:** UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment FCC Compliant to Part 15.247 Regulations for Low Power Unlicensed Transmitters (Other compliance information pending)
	Canada: UL Listed, File E27734, CCN XAPX7, Under CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment Industry Canada, ICES-003 (Other compliance information pending)
Dimensions (H x W x D)	**TEC20xx(H)-4 Models:** 125 x 86 x 29 mm (4-15/16 x 3-3/8 x 1-1/8 in.) **TEC20xx-4+PIR Models:** 125 x 86 x 36 mm (4-15/16 x 3-3/8 x 1-3/8 in.)
Shipping Weight	**TEC20xx(H)-4 Models:** 0.75 lb (0.34 kg) **TEC20xx-4+PIR Models:** 0.77 lb (0.35 kg)

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure (OET Bulletin 65)

To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.

Canadian Emissions Compliance

Industry Canada Statement

The term **IC** *before the certification/registration number only signifies that the Industry Canada technical specifications were met.*

Le terme « IC » précédant le numéro d'accréditation/inscription signifie simplement que le produit est conforme aux spécifications techniques d'Industrie Canada.

Section 5.5 of RSS-210

This device has been designed to operate with an antenna having a maximum gain of 3.2 dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

Cet appareil a été conçu pour fonctionner avec une antenne d'un gain maximum de 3.2 dBi. En application des réglementations d'Industrie Canada, l'utilisation d'une antenne de gain supérieur est strictement interdite. L'impédance d'antenne requise est de 50 ohms.

Section 5.11 of RSS-210

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Pour réduire les interférences radio potentielles avec les dispositifs d'autres utilisateurs, le type d'antenne et son gain doivent être choisis de façon à ce que la puissance isotrope rayonnée équivalente (PIRE) ne soit pas supérieure à la puissance nécessaire pour une bonne communication.

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202